

REMARKS/ARGUMENTS

The Office Action mailed **August 25, 2006**, has been carefully considered.

Reconsideration in view of the following remarks is respectfully requested.

Claims 12-44, 46, and 51-70 are currently pending. No claims are allowed.

Claims 12, 16, 18, 25, 29, 31, 38, 39, 40, 41, 46, and 47 have been amended to further particularly point out and distinctly claim subject matter regarded as the invention. Support for these changes may be found in the specification, figures, and claims as originally filed, specifically ¶¶ 10, 16, 20, and 46, and FIG. 1. The text of claims 13-15, 17, 19-24, 26-28, 30, 32-37, 43-44, and 50 is unchanged, but their meaning is changed because they depend from amended claims.

Claims 1-11, 45, and 48-49 have been previously canceled, without prejudice or disclaimer of the subject matter contained therein.

New claims 51-70 also particularly point out and distinctly claim subject matter regarded as the invention. Support for these claims may be found in the specification, figures, and claims as originally filed, specifically ¶¶ 10, 12, 16, 20, 40, 41, 46, and 48, and FIG. 1.

With this Amendment it is respectfully submitted the claims satisfy the statutory requirements.

The 35 U.S.C. § 102 Rejection

Claims 12-42, 44, 46-47, and 50 were rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by Tang, et al.¹ ² Tang et al. incorporates by reference Gleeson et al.³ This rejection is respectfully traversed.

According to the M.P.E.P., a claim is anticipated under 35 U.S.C. § 102(a), (b) and (e) only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.⁴

Claim 12

Claim 12 as presently amended recites:

A method for handling a control message in a Virtual Local Area Network (VLAN), the method comprising:
receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router;
updating a source-group data structure using information from the control message, the source-group data structure containing data regarding a multicast group; and
adding an outgoing port index to said source-group data structure, said outgoing port index identifying a port that received the control message.

The Examiner states:

... Gleeson shows a method comprising: updating a source-group data structure using information from the control message, the source-group data structure containing data regarding a multicast group [See Fig. 2c of Gleason, which is a "source-group data structure." It contains multicast group address. See lines 21-32 in column 2 of Gleason. See lines 30-35 in column 16 for the step of updating the data structure]; and adding an outgoing port index to data source-group data structure, said outgoing port index identifying a port that received the control message [See Fig. 2C, which lists a port index ('port number') in the table].

¹ U.S. Patent No. 6,839,348 to Tang et al.

² Office Action dated August 25, 2006, at p. 4.

³ U.S. Patent No. 5,959,989 to Gleeson et al.

⁴ Manual of Patent Examining Procedure (MPEP) § 2131. See also *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Inserting the source group necessarily adds a port number, because the data structure includes a field for the "port index."].⁵

The Applicants respectfully disagree for the reasons set forth below.

Tang et al. and Gleeson et al. speak generally about creating a special label or tag for multicast packets. As pointed out in the Background section of the Application as filed, although tag switching enables a layer 3 router to read the tag and forward the packet, the router must be specially configured to interpret the tag.⁶ Whereas embodiments of the invention as presently claimed intelligently implement layer 2 switching among multiple input/output ports that are connected to neighboring devices such as routers. Protocol snooping limits the multicast content to only those routers, within a VLAN, that require the content. Intelligent forwarding is based on information learned from control messages exchanged between multicast routers, thus obviating the need for any specialized tagging technique. With this Amendment, independent claims 12, 16, 18, 25, 29, 31, 38, 39, 40, 41, and 46 have been amended to make this distinction more clear. Specifically, the independent claims have been modified to recite handling a control message *in a Virtual Local Area Network (VLAN), and receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router.* For this reason, the 35 U.S.C. § 102 rejection of Claim 12 based on Tang et al. is unsupported by the art and must be withdrawn.

Moreover, Gleeson et al. discloses processing messages from the Clients (sources); the reference does not disclose processing control messages from a *router*. Whereas Claim 12 requires that the source-group data structure is built from control messages sent from one multicast router to another multicast router through the switch. For this additional reason, the 35 U.S.C. § 102 rejection of Claim 12 based on Tang et al. is unsupported by the art and must be withdrawn.

⁵ Office Action at pp. 4-5.

Claims 13-15

Claims 13-15 depend from Claim 12. The base claim being allowable, the dependent claims must also be allowable.

Claim 15

Claim 15 recites:

The method of Claim 12, further comprising:
searching in a forwarding table for a forwarding entry having a destination hardware address matching a destination hardware address for a multicast group indicated by the control message; and
updating said forwarding entry in said forwarding table if a destination hardware address matching a destination hardware address for said multicast group is found.

The Examiner states:

... Tang shows searching in a forwarding table for a forwarding entry having a destination hardware address matching a destination hardware address for a multicast group indicated by the control message [See from line 35, column 15 to line 3 in column 16 of Tang]; and updating said forwarding entry in said forwarding table if a destination hardware address matching a destination hardware address for said multicast group is found [See from line 35, column 15 to line 3 in column 16 of Tang].

The Applicants respectfully disagree. The arguments made above with respect to Claim 12 apply here as well. The portion of Tang et al. referenced by the Examiner refers to the operation of a layer 3 router, not a layer 2 switch as required by Claim 15. For this additional reason, the U.S.C. § 102 rejection of Claim 15 based on Tang et al. is unsupported by the art and must be withdrawn.

⁶ Specification, Background Section, ¶ 6.

Claim 16

Claim 16 as presently amended recites:

A method for handling a control message in a Virtual Local Area Network (VLAN), the method comprising:
receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router;
deriving an explicit source lookup key from the control message;
retrieving an outgoing port index associated with an entry in a session data structure, said entry corresponding to said explicit source lookup key; and
updating an outgoing lookup table entry corresponding to said outgoing port index with information regarding designated devices in said multicast group indicated by the control message.

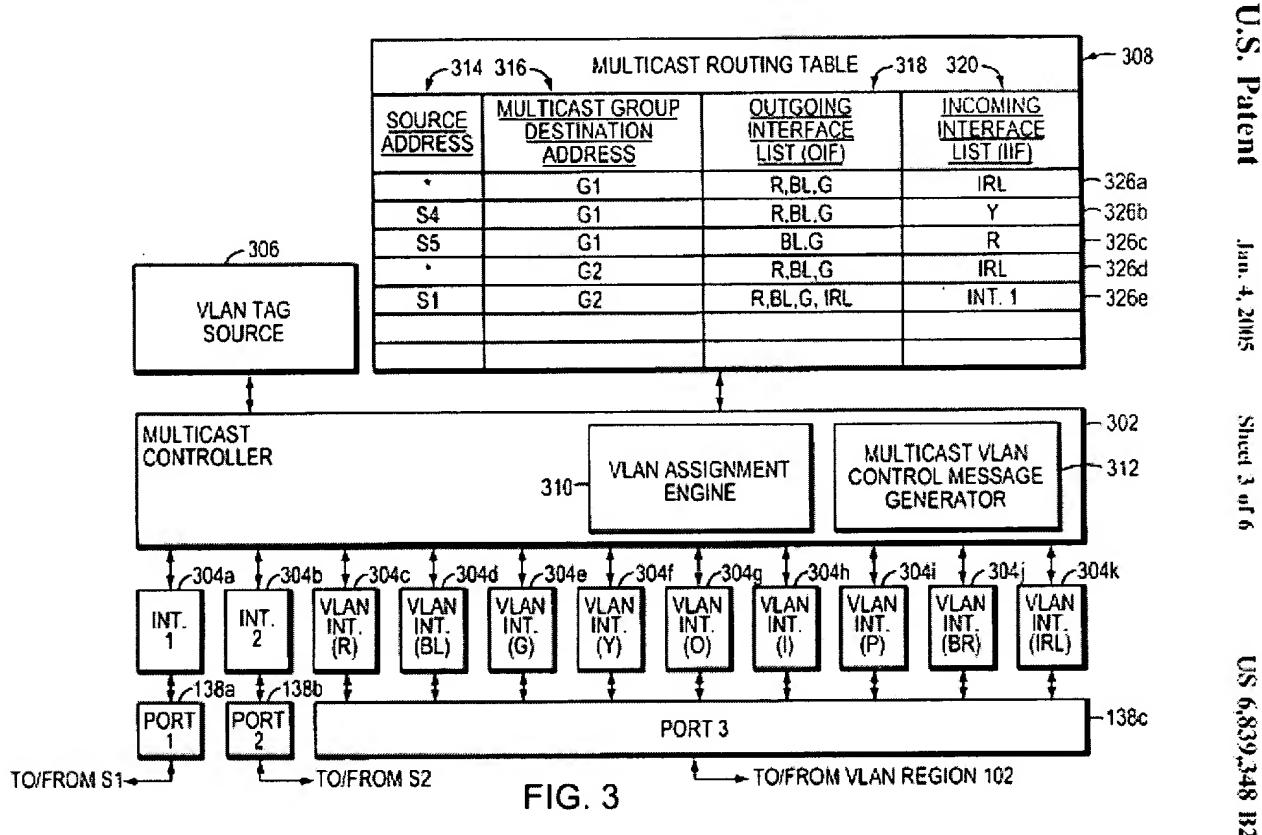
The Examiner states:

... Tang and Gleeson show a method comprising deriving an explicit source lookup key from the control message [See lines 50-67 in column 16 of Tang. S4, which is the specific source address, is the "source lookup key."]; and retrieving an outgoing port index associated with an entry in a session data structure, said entry corresponding to said explicit source lookup key ["Session data structure" are the rows, in the multicast routing table ("forwarding table"). Each entry of the outgoing interface list is associated with an interface ("outgoing port index") shown in Fig. 3. The retrieval is performed by looking up the forwarding table]; and updating an outgoing lookup table entry corresponding to said outgoing port index with information regarding designated devices in said multicast group indicated by the control message [See Fig. 3 of Tang. The outgoing lookup table entry is either IIF or OIF-in the-multicast routing table. It is updated in accordance with the; description, starting at line 16, column 16 to line 17, in column 19].⁷

The Applicants respectfully disagree. The arguments made above with respect to Claim 12 apply here as well. The portion of Tang et al. referenced by the Examiner refers to the operation of a layer 3 router, not a layer 2 switch as required by Claim 16. For this additional reason, the 35 U.S.C. § 102 rejection of Claim 16 based on Tang et al. is unsupported by the art and must be withdrawn.

⁷ Office Action at p. 6.

Additionally, contrary to the Examiner's statement, Tang et al. does not disclose deriving an explicit source lookup key from the control message. In support of the Examiner's contention, the Examiner refers to FIG. 3 of Tang et al., which is included below for the Examiner's convenience.



Tang et al. recites:

To forward the multicast message from entity S4, multicast controller 302 first performs a Reverse Path Forwarding (RPF) check on the received message. In particular, multicast controller 302 checks to see whether the message was received on the interface used to send unicast messages to entity S4 (i.e., the yellow VLAN interface), which is also listed in the IIF for this {S4, G1} source-specific route entry.⁸

Thus, rather than deriving an explicit source lookup key from the control message as required by Claim 16, Tang et al. obtains an incoming port from the incoming interface list (IIF) of a multicast routing table, where the incoming interface is obtained by performing a reverse path

forwarding (RPF) check on the received message. An RPF check is possible in Tang et al. because Tang et al. discloses layer 3 processing. Whereas Claim 16 recites processing on a layer 2 switch, and the tables required to perform such an RPF check are not present on layer 2 switches. For this reason, the 35 U.S.C. § 102 rejection of Claim 16 based on Tang et al. is unsupported by the art and must be withdrawn.

Claim 17

Claim 17 depends from Claim 16. The base claim being allowable, the dependent claim must also be allowable.

Claim 18

Claim 18 as presently amended recites:

A method for handling a control message in a Virtual Local Area Network (VLAN), the method comprising:
receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router;
determining if the control message establishes shared source distribution trees or explicit source distribution trees;
updating a source-group data structure using information from the control message, the source-group data structure containing data regarding a multicast group, if the control message establishes shared source distribution trees;
adding an outgoing port index to said source-group data structure, said outgoing port index identifying a port that received the control message if the control message establishes shared source distribution trees;
deriving an explicit source lookup key from the control message if the control message establishes explicit source distribution trees;
retrieving an outgoing port index associated with an entry in a session data structure, said entry corresponding to said explicit source lookup key, if the control message establishes explicit source distribution trees; and
updating an outgoing lookup table entry corresponding to said outgoing port index with information regarding designated devices in said multicast group

⁸ Tang et al. at col. 16 ll. 50-56.

indicated by the control message if the control message establishes explicit source distribution trees.

The Examiner states:

... Tang and Gleeson show a method comprising determining if the control message establishes shared source distribution trees or explicit source distribution trees [The step is inherent in Tang. Tang's system responds differently depending on the source address, whether it is shared source distribution tree or it is an explicit source distribution tree. If it is a shared distribution tree, the system follows the steps described from line 16, column 15 to line 13, column 16 in Tang. If the message is an explicit one, Tang's system follows the steps described from line 14, column 16 to line 19, column 19]; Other limitations of claim 18 are same as those of claims 12 and 16, with one difference. The limitations which correspond to those in claim 12 are different than those of claim 12 because of an additional clause, "if the control message establishes shared source distribution trees." Gleason still meets the limitations, because the steps (which correspond to the limitations of claim 12) apply to both shared source distribution and non-shared.⁹

The Applicants respectfully disagree. Claim 18 includes limitations similar to Claim 12 and 16.

Thus, the arguments made above with respect to Claims 12 and 16 apply here as well.

Additionally, the Applicants respectfully submit that the rejection of Claim 18 lacks the clarity required by the M.P.E.P.¹⁰ The rejection of Claim 18 refers to "other limitations of claim 18 are same as those of claims 12 and 16," without identifying the precise elements to which the Examiner intends to refer. The Examiner is reminded that a proper rejection under 35 U.S.C. § 102 requires that "[t]he identical invention must be shown in as complete detail as contained in the ... claim."¹¹

The rejection of Claim 18 also appears to indicate that Tang et al. discloses performing a first set of actions only if the control message establishes shared distribution trees, and

⁹ Office Action at pp. 6-7.

¹⁰ See M.P.E.P. § 707.07(f) ("In order to provide a complete application file history and to enhance the clarity of the prosecution history record, an examiner must provide clear explanations of all actions taken by the examiner during prosecution of an application."). See also M.P.E.P. § 707.07(d) ("Where a claim is refused for any reason relating to the merits thereof it should be 'rejected' and the ground of rejection fully and clearly stated, and the word 'reject' must be used.").

¹¹ *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). See also M.P.E.P. § 2131.

performing a second set of actions only if the control message establishes explicit source distribution trees, and further that Gleeson et al. discloses performing the first set of actions *regardless* of whether the control message establishes shared source distribution trees or explicit source distribution trees. If so, the Examiner's statements reveal one reason why Tang et al., which incorporates Gleeson et al., does not anticipate Claim 18, is non-enabling, or both.

Claims 19-24

Claims 19-24 depend from Claim 18. The base claim being allowable, the dependent claims must also be allowable.

Claims 19-22

Claims 19-22 include limitations similar to Claims 13-15 and 17. Thus, the arguments made with respect to Claims 13-15 and 17 apply here as well.

Claim 23

Claim 23 recites:

The method of Claim 18, further comprising:
determining if the control message is a hello or join/prune message; and
performing said determining, updating a source-group data structure, adding,
deriving, retrieving, and updating an outgoing lookup table entry only if said
control message is a join/prune message.

The Examiner states:

... Tang shows determining if the control message is a hello or join/prune message [identification of the message type is inherent in multicast network device in Tang. MND's implement PIM protocol. See lines 15-39, column 10] and performing said determining, updating, a source-group data structure, adding, deriving, retrieving, and updating an outgoing lookup table entry only if said control message is a join/prune message. [See the above discussion of Tang in the preceding claims. All of the preceding functions are only performed when the

message is a join message. The 'group forwarding table' 250 in Fig. 2C can only be updated upon join/prune, because it requires subscription data changes.¹²

The Applicants respectfully disagree. Claim 23 requires performing said determining, updating a source-group data structure, adding, deriving, retrieving, and updating an outgoing lookup table entry *only* if said control message is a join/prune message. (emphasis added) The Examiner has not pointed to where Tang et al. discloses the listed actions are performed *only* if said control message is a join/prune message.

The Applicants respectfully submit that the Examiner's statement that "[t]he 'group forwarding table' 250 in Fig. 2C can only be updated upon join/prune, because it requires subscription data changes" does not address the claimed limitations of Claim 23. First, the fact that a join/prune requires subscription data changes does not preclude the possibility that another event would also require subscription data changes. Secondly, even if the Examiner's statement is true, it does not address the requirement that the "deriving" and "retrieving" steps also be performed only if said control message is a join/prune message. For these additional reasons, the 35 U.S.C. § 102 rejection of Claim 23 based on Tang et al. is unsupported by the art and must be withdrawn.

Claim 24

Claim 24 recites:

The method of Claim 23, further comprising:
creating or updating a neighbor list using said hello message, said neighbor list identifying address and port information regarding a device which sent the control message.

The Examiner states:

¹² Office Action at p. 7.

With respect to claim 24, Tang's device implements PIM hello [See lines 15-39, column 10]. Implementation of hello entails creating or updating a neighbor list using said hello message, said neighbor list identifying address ad port information regarding device which sent the control message. In other words, the limitation merely repeats what any system that implements hello is capable of performing.¹³

The Examiner admits that Tang et al. does not teach creating or updating a neighbor list using said hello message, said neighbor list identifying address and port information regarding a device which sent the control message, but does not provide a specific reference where such a limitation is found, instead arguing that any system that implements PIM hello would perform the recited limitation. Therefore, the Applicants assume that the Examiner intended to take official notice of facts under M.P.E.P. § 2144.03 that the rationale supporting the rejection is based on common knowledge in the art or "well-known" prior art. Under M.P.E.P. § 2144.03, "[i]f the applicant traverses such an assertion the examiner should cite a reference in support of his or her position." The Applicants hereby traverse the assertion and request that a reference be cited in support of the position outlined in the Office Action.

Claims 25-37

Claims 25-37 are means-plus-function claims corresponding to method claims 12-24, respectively. Claims 12-24 being allowable, Claims 25-37 must be allowable for at least the same reasons.

¹³ Office Action at p. 7.

Claims 38-40

Claims 38, 39, and 40 are *In re Beauregard* claims corresponding to method claims 12, 16, and 18, respectively. Claims 12, 16, and 18 being allowable, Claims 38, 39, and 40 must be allowable for at least the same reasons.

Claim 41

Claim 41 as presently amended recites:

A method for handling a control message in a Virtual Local Area Network (VLAN), the method comprising:
receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router;
deriving a shared source lookup key from multicast group information in the control message;
searching a forwarding data structure for a forwarding entry having a shared source lookup key matching the shared source lookup key;
if a forwarding entry having a shared source lookup key matching the destination shared source lookup key is found, revising an associated outgoing port in the forwarding entry to match an incoming port for the control message;
extracting multicast group information from the control message;
updating a source-group data structure with the multicast group information; and
adding an outgoing port index to the source-group table, the outgoing port index identifying a port that received the control message.

Tang et al. does not disclose receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router. With this Amendment, Claim 41 has been amended to make this distinction more clear. For this reason, the 35 U.S.C. § 102 rejection of Claim 41 based on Tang et al. is unsupported by the art and must be withdrawn.

Claims 42-44

Claims 42-44 depend from Claim 41. The base claim being allowable, the dependent claims must also be allowable.

Claim 46

Claim 46 as presently amended recites:

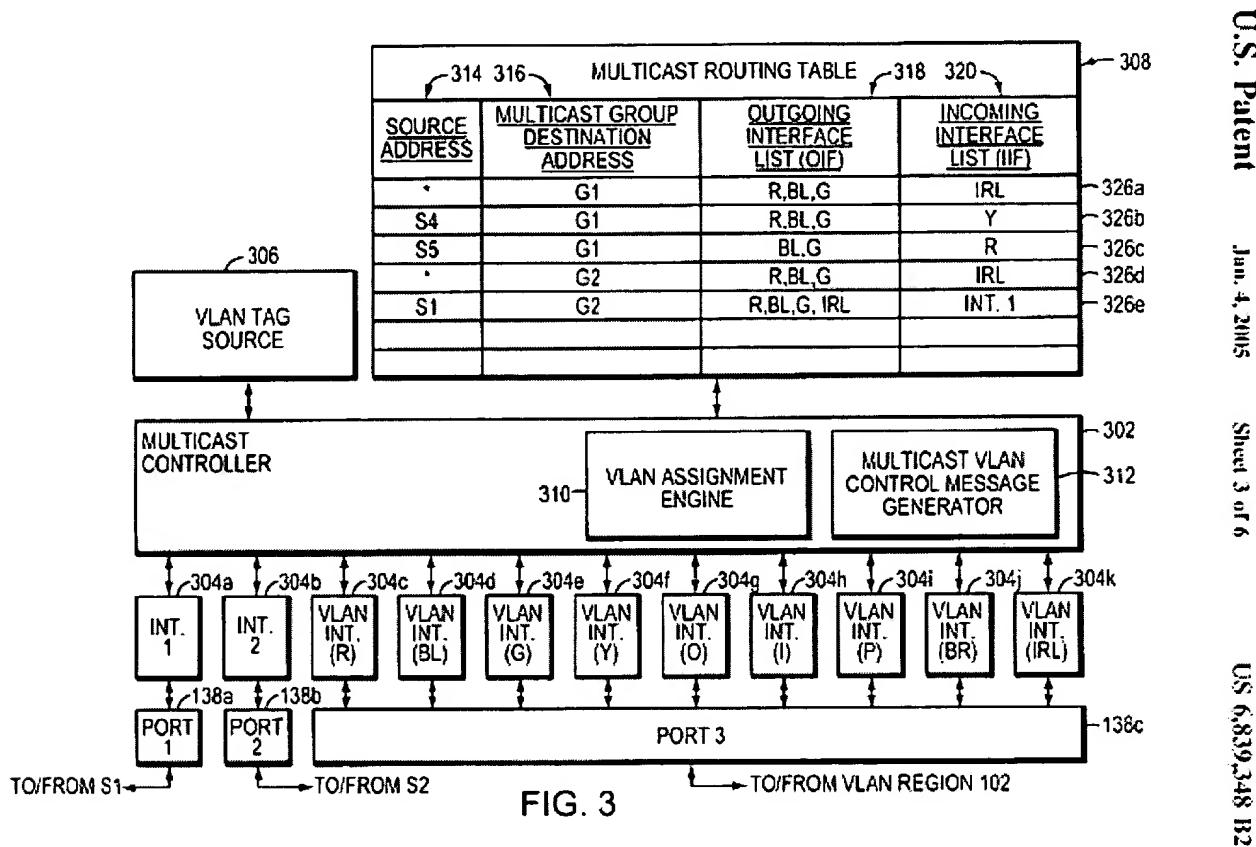
A method for handling a control message in a Virtual Local Area Network (VLAN), the method comprising:
receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router;
deriving an explicit source lookup key from the control message;
searching a session data structure for a session entry having an explicit source lookup key matching the derived explicit source lookup key; and
if a session entry having an explicit source lookup key matching the derived explicit source lookup key is found, revising an associated outgoing port in the session entry to match an incoming port for the control message.

The Examiner states:

... Tang shows deriving an explicit source lookup key from the control packet [See lines 27-49, column 16. S4 is the source lookup key and it is an address]; searching a session data structure for a session entry having an explicit source lookup key matching the derived explicit source lookup key ["Session data structure" correspond to the rows, in the multicast routing table ("forwarding table"). Each entry of the outgoing interface list is associated with an interface ("outgoing port index") shown in Fig. 3. The retrieval is performed upon searching the session data structure. See from lines 27-49, column 16.]; if a session entry having an explicit source lookup key matching the derived explicit source lookup key is found, revising an associated outgoing port in the session entry to match an incoming port for the control message [See Fig. 3 of Tang. The outgoing lookup table entry is either IIF or 01F in the multicast routing table. It is revised in accordance with the description, starting at line 16, column 16 to line 17, in column 19.].¹⁴

¹⁴ Office Action at p. 9.

Contrary to the Examiner's statement, Tang et al. does not disclose deriving an explicit source lookup key from the control message. In support of the Examiner's contention, the Examiner refers to FIG. 3 of Tang et al., which is included below for the Examiner's convenience.



Tang et al. recites:

To forward the multicast message from entity S4, multicast controller 302 first performs a Reverse Path Forwarding (RPF) check on the received message. In particular, multicast controller 302 checks to see whether the message was received on the interface used to send unicast messages to entity S4 (i.e., the yellow VLAN interface), which is also listed in the IIF for this {S4, G1} source-specific route entry.¹⁵

Thus, rather than deriving an explicit source lookup key from the control message as required by Claim 46, Tang et al. obtains an incoming port from the incoming interface list (IIF) of a multicast routing table, where the incoming interface is derived by performing a reverse path forwarding (RPF) check on the received message. An RPF check is possible in Tang et al..

because Tang et al. discloses layer 3 processing. Whereas Claim 47 recites processing on a layer 2 switch, and the tables required to perform such an RPF check are not present on layer 2 switches. For this reason, the 35 U.S.C. § 102 rejection of Claim 47 based on Tang et al. is unsupported by the art and must be withdrawn.

Additionally, Tang et al. does not disclose receiving a control message at a layer 2 switch of said VLAN, said control message sent by a layer 3 router. With this Amendment, Claim 46 has been amended to make this distinction more clear. For this additional reason, the 35 U.S.C. § 102 rejection of Claim 41 based on Tang et al. is unsupported by the art and must be withdrawn.

Claims 47 and 50

Claims 47 and 50 depend from Claim 46. The base claim being allowable, the dependent claims must also be allowable.

Claim 47

Claim 47 as presently amended recites:

The method of Claim 46, wherein the explicit source lookup key comprises a multicast source network address, a destination network address, an incoming port for the control message, and a protocol type.

The Examiner states:

... Tang shows that the explicit source lookup key is a combination of a multicast source network address, a destination network address, and incoming port for the control message and a protocol type. See Fig. 3. Any element of each row in the multicast routing table maybe used as a key. Note that even though protocol type

¹⁵ Tang et al. at col. 16 ll. 50-56.

is not included in the table, Tang's feature still meets the limitation, because the limitation does not require the-presence-of the port type. The limitation prescribes some "combination" of "source network address, destination network address, and incoming port.¹⁶

The Applicants respectfully disagree. With this Amendment, Claim 47 has been amended to recite the explicit source lookup key *comprises* a multicast source network address, a destination network address, an incoming port for the control message, and a protocol type. This is not disclosed by the cited art of record.

Additionally, contrary to the Examiner's statement, Tang et al. does not disclose the explicit source lookup key comprises an incoming port for the control message. In support of the Examiner's contention, the Examiner refers to FIG. 3 of Tang et al., which is included below for the Examiner's convenience.

¹⁶ Office Action at p. 10.

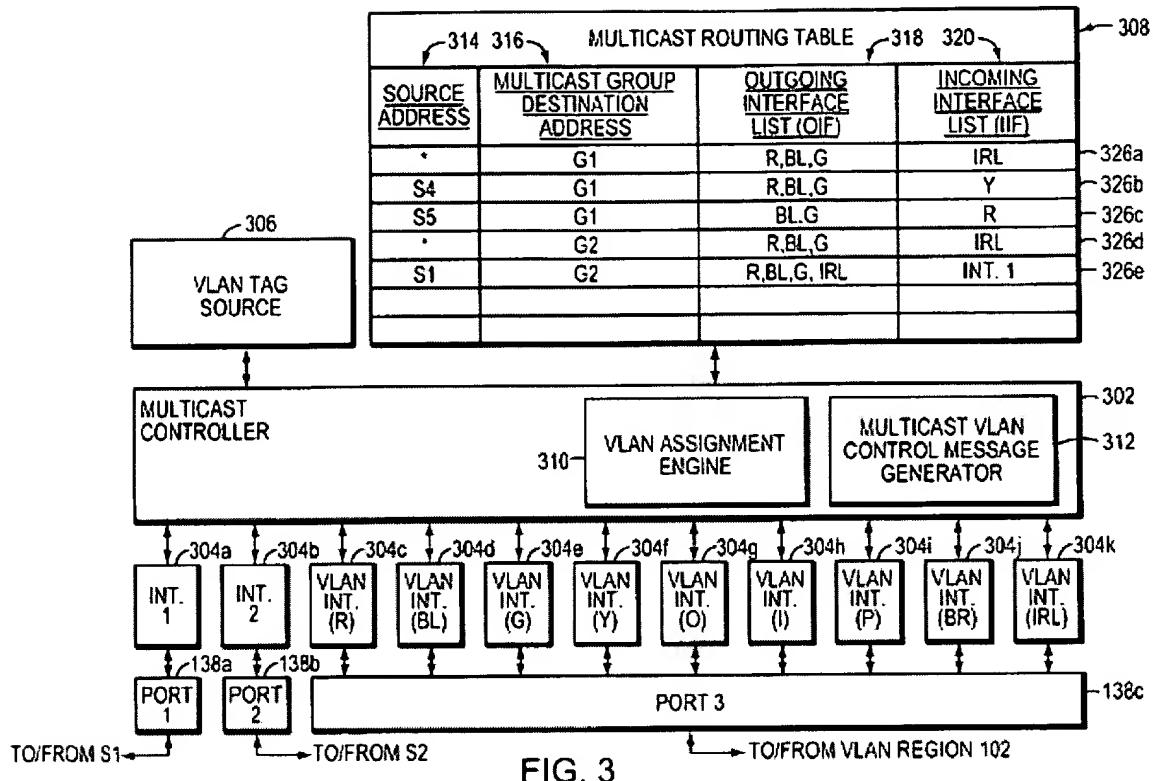


FIG. 3

Tang et al. recites:

To forward the multicast message from entity S4, multicast controller 302 first performs a Reverse Path Forwarding (RPF) check on the received message. In particular, multicast controller 302 checks to see whether the message was received on the interface used to send unicast messages to entity S4 (i.e., the yellow VLAN interface), which is also listed in the IIF for this {S4, G1} source-specific route entry.¹⁷

Thus, rather than using the incoming port for the control message as required by Claim 47, Tang et al. obtains an incoming port from the incoming interface list (IIF) of a multicast routing table, where the incoming interface is derived by performing a reverse path forwarding (RPF) check on the received message. An RPF check is possible in Tang et al. because Tang et al. discloses layer 3 processing. Whereas Claim 47 recites processing on a layer 2 switch, and the tables required to perform such an RPF check are not present on layer 2 switches. For this reason, the 35 U.S.C. § 102 rejection of Claim 47 based on Tang et al. is unsupported by the art and must be withdrawn.

Claim 50

Claim 50 recites:

The method of Claim 46, further comprising:
extracting multicast group information from the control message;
updating a source-group data structure with the multicast group information; and
adding an outgoing port index to the source-group table, the outgoing port index
identifying a port that received the control message.

The Examiner states:

Claim 50 substantively incorporates the limitations of claim 45, and the reasons
for the rejection of claim 45 apply to claim 50.¹⁸

The Applicants note that Claim 45 was previously cancelled. As the rejection of Claim 50 is
based on a purported rejection of a cancelled claim, there is no basis for rejection of Claim 50.
Withdrawal of the rejection of Claim 45 is respectfully requested.

In view of the foregoing, it is respectfully asserted that the claims are now in condition
for allowance.

Conclusion

It is believed that this Amendment places the above-identified patent application into
condition for allowance. Early favorable consideration of this Amendment is earnestly solicited.

If, in the opinion of the Examiner, an interview would expedite the prosecution of this
application, the Examiner is invited to call the undersigned attorney at the number indicated
below.

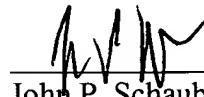
¹⁷ Tang et al. at col. 16 ll. 50-56.

The Applicants respectfully request that a timely Notice of Allowance be issued in this case. Please charge any additional required fee or credit any overpayment not otherwise paid or credited to our deposit account No. 50-1698.

Respectfully submitted,

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Dated: January 25, 2007



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¹⁸ Office Action at p. 10.